US Army Medical Research and Materiel

Technology Available for Licensing

Immobilized Enzymes Biosensors for Chemical Toxins

This invention is a method for detecting hazardous chemicals, including chemical warfare agents and insecticides. It provides a means for detecting organophosphorous and organosulfur compounds (both referred to as OP compounds) using biosensors. The biosensors consist of enzymes that are immobilized on or inside a porous or a non-porous support by covalent bonds. The biosensors exhibit enzymatic stability at extreme temperatures and/or denaturing conditions and display kinetic characteristics that are similar to the soluble form of the enzymes utilized. The enzymes do not leach from the porous or non-porous supports and the material retains enzymatic activity after prolonged storage.

The enzyme used in the biosensor may be acetylcholinesterase (AChE), butyrylcholinesterase (BChE), triesterase, pseudocholinesterase, choline oxidase, peroxidase, organophosphate hydrolase (OPH), phosphotriesterase or paraoxonase, wherein the OP compounds are inhibitors of one or more of the enzymes. The biosensor may comprise multiple zones which form an array, and each zone may contain an individual enzyme which is selected to differentiate between one or more of the OP compounds.

pounds are used extensively in insecticides and are highly toxic to many organisms including humans. Insecticide residues are found in soil and groundwater, and the detection of these residues is important for their ion from the environment and to protect the h of both humans and animals. OP compounds are also used as chemical warfare nerve agents, such as sarin, soman, and tabun.

Features and advantages:

- **Retains enzymatic activity by immobilizing enzymes on a porous support, which reduces air induced shear forces**
- **Extreme temperatures and/or denaturing conditions do not affect enzyme stability**
- **Suitable for long-term (weeks to months) detection of OPs in remote locations**
- **Indicates OP compounds by fluorescent, chromogenic or determination**
- **Could be designed to substances of interest**

Patent Status

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